PLM-1
PAL* ADAPTOR

User's Manual

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1.Ø INTRODUCTION

The PROMPRO-XP/8X PAL ADAPTOR MODULE supports all 2Ø- and 24-pin PAL's manufactured by Monolithic Memories and National Semiconductor, and all 2Ø-pin PAL's manufactured by Texas Instruments. Throughout this document, the PAL Adaptor Module is referred to as the "PLM-1"; the PROMPRO-XP/8X PROM Programmer is referred to as the "XP/8X".

The PLM-1 allows you to read and copy from a master PAL, download a file from a computer into the XP/8X's internal RAM, blow security fuses, examine and modify the fuse map, and upload the contents of RAM to a computer for storage in a disk file. You may also use most other standard XP/8X commands.

The PLM-1's hardware is designed to support most future 2Ø- and 24-pin PAL's produced by Monolithic Memories and their equivalents. LOGICAL DEVICES, INC. will provide firmware upgrades for the PLM-1 which will allow you to program these new devices when they become available.

Figure 1 illustrates the PLM-1.

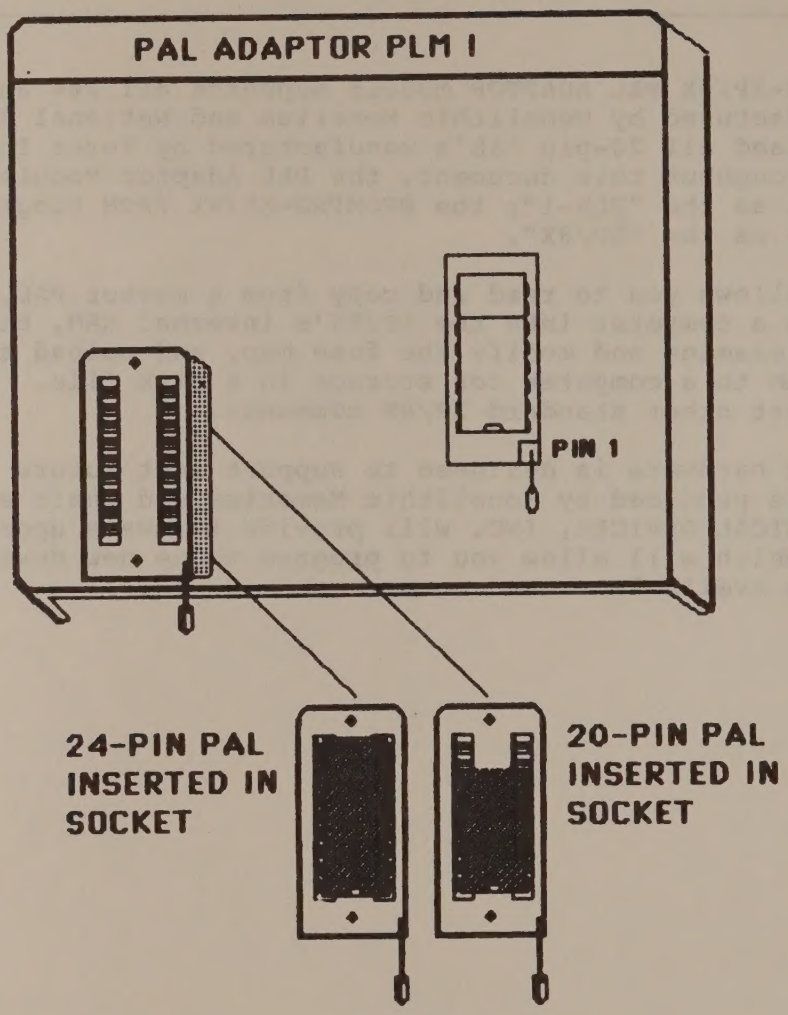


FIGURE 1

PROMPRO-XP/8X PAL ADAPTOR MODULE (PLM-1)

2.0 SET-UP PROCEDURE

1. Turn the power switch on the rear panel of the XP/8X to the "OFF" position.

2. Determine whether the PAL to be examined or programmed is a 20-pin or 24-pin model. Set the jumper block on the underside of the PLM-1 accordingly, as shown in Figure 2.

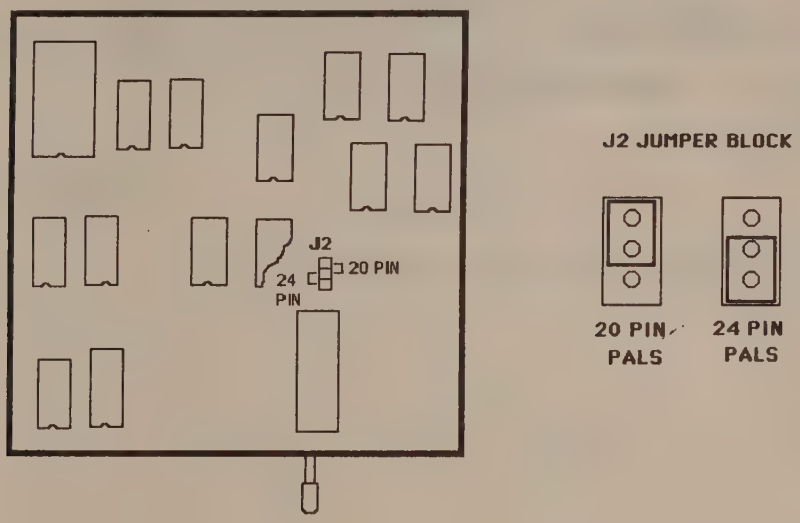


FIGURE 2

SETTING THE PLM-1 JUMPER BLOCK FOR A 20-PIN OR 24-PIN PAL

3. Remove the ZIFKEY from the SKT-2 socket. The ZIFKEY is a small plastic insert provided to prevent the user from improperly inserting devices into the ZIF socket.

4. Make sure that the ground strap is securely attached to the ground post on the front panel of the XP/8X, as shown in Figure 3.

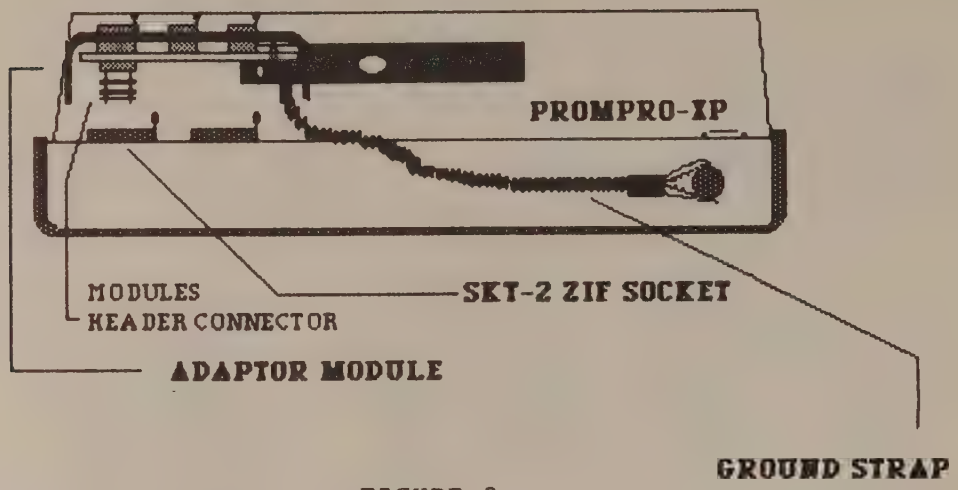


FIGURE 3

GROUND STRAP CONNECTION FROM THE PLM-1 TO THE XP/8X

5. Open the ZIF socket by moving the ZIF handle to the upright position, as shown in Figure 4.

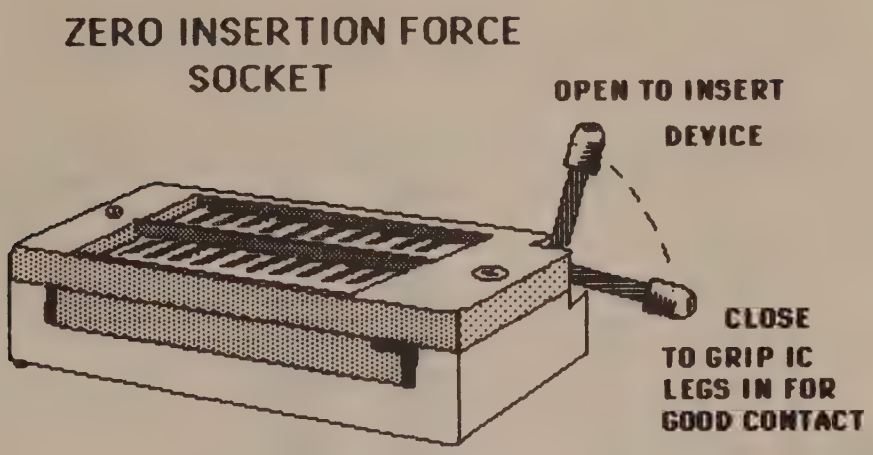


FIGURE 4

HOW TO OPEN A ZIF SOCKET

6. Mount the adaptor module onto the ZIF socket, as shown in Figure 5.

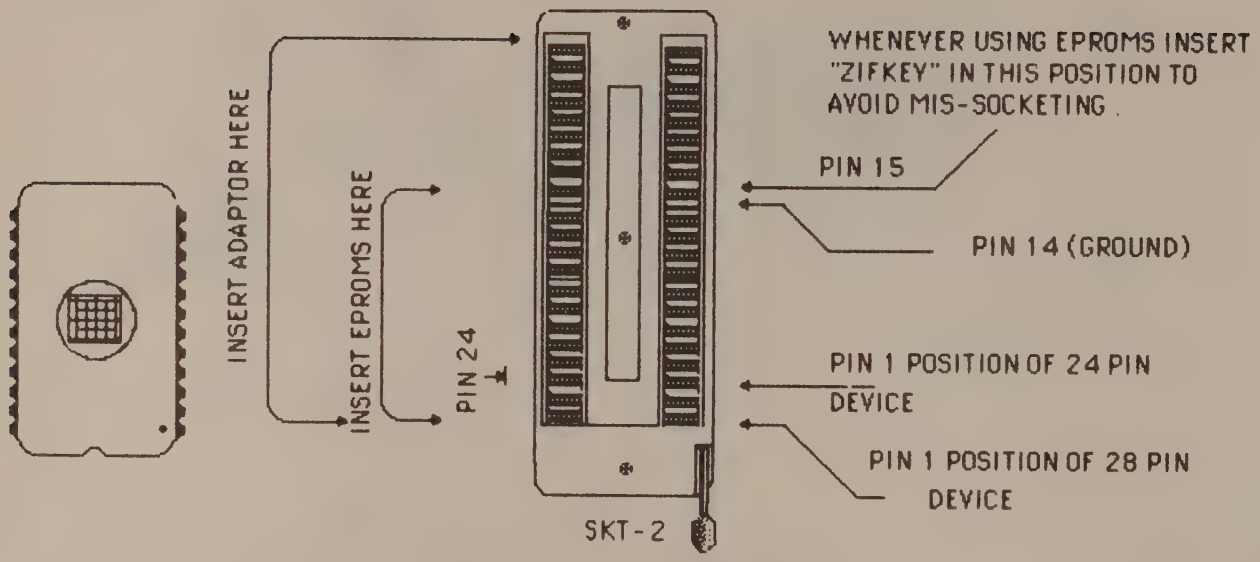

INSERT ADAPTOR HERE
INSERT EPROMS HERE
PIN 24
SKT-2
WHENEVER USING EPROMS INSERT "ZIFKEY" IN THIS POSITION TO AVOID MIS-SOCKETING.
PIN 15
PIN 14 (GROUND)
PIN 1 POSITION OF 24 PIN DEVICE
PIN 1 POSITION OF 28 PIN DEVICE

FIGURE 5

MOUNTING THE PLM-1 ONTO THE ZIF SOCKET

7. Close the ZIF socket by moving the ZIF handle to the down position.

8. Turn the power switch on the rear panel of the XP to the "ON" position.

9. Enter the "DEVICE SELECT" command to identify the type of PAL to be examined or programmed (see Section 5.1) for instructions on how to use this command).

3.Ø DEVICE DICTIONARY

The following tables list the devices which may be programmed with the PLM-1. Refer to these tables to determine the proper code to use with the "DEVICE SELECT" command.

Table 1 lists 2Ø-pin PAL's manufactured by Monolithic Memories and National Semiconductor, and their corresponding device codes.

PAL TYPE	DEVICE CODE	PAL TYPE	DEVICE CODE
PAL1ØH8	ØØ	PAL16L2	Ø8
PAL12H6	Ø1	PAL16L8	Ø9
PAL14H4	Ø2	PAL16R8	ØA
PAL16H2	Ø3	PAL16R6	ØB
PAL16C1	Ø4	PAL16R4	ØC
PAL1ØL8	Ø5	PAL16X4	ØD
PAL12L6	Ø6	PAL16A4	ØE
PAL14L4	Ø7		

TABLE 1

DEVICE CODES FOR 2Ø-PIN PAL'S MADE BY
MONOLITHIC MEMORIES AND NATIONAL SEMICONDUCTOR

Table 2 lists 24-pin PAL's manufactured by Monolithic Memories and National Semiconductor, and their corresponding device codes.

PAL TYPE	DEVICE CODE	PAL TYPE	DEVICE CODE
PAL12L10	00	PAL20X10	07
PAL14L8	01	PAL20X8	08
PAL16L6	02	PAL20X4	09
PAL18L4	03	PAL20L8	0A
PAL20L2	04	PAL20R8	0B
PAL20C1	05	PAL20R6	0C
PAL20L10	06	PAL20R4	0D

TABLE 2

DEVICE CODES FOR 24-PIN PAL'S MADE BY
MONOLITHIC MEMORIES AND NATIONAL SEMICONDUCTOR

Table 3 lists 20-pin PAL's manufactured by Texas Instruments, and their corresponding device codes. Note that each device code corresponds to three separate PAL types. However, the XP/8X's keypad display does not list the PAL's which start with "74PAL".

PAL TYPE	DEVICE CODE	PAL TYPE	DEVICE CODE
74PL16L8	0F	74PL16R6	11
74PAL16L8	0F	74PAL16R6	11
74PAL16L8A	0F	74PAL16R6A	11
74PL16R4	10	74PL16R8	12
74PAL16R4A	10	74PAL16R8	12
74PAL16R4	10	74PAL16R8A	12

TABLE 3

DEVICE CODES FOR 20-PIN PAL'S MADE BY TEXAS INSTRUMENTS

4.0 COMMAND SUMMARY/ERROR MESSAGES

COMMAND SUMMARY

Table 4 lists the name and function of PLM-1 commands.

COMMAND	FUNCTION
BLANK CHECK	Determine whether fuses are intact.
DEVICE SELECT	Select type of PAL to be examined or programmed.
DOWNLOAD	Transfer a file from a computer to the XP/8X's internal RAM.
EXAM	Examine contents of RAM.
LOAD	Read contents of PAL into RAM.
PROGRAM	Remove specified fuse.
SECURE PAL	Remove both security fuses.
VERIFY	Verify that all valid fuses are of the same polarity as XP/8X's internal RAM.

TABLE 4

PLM-1 COMMAND SUMMARY

ERROR MESSAGES

ERR.HEDR — Header error... data ends before valid field detected.

ERR.NBIN — Characters in list field not zero or one.

ERR.JFMT — Format error:
1. Fuse number in JEDEC file is larger than the maximum fuse of the selected device.
2. Data ends before termination character (asterisk).

ERR.CKSM — Checksum error.

OVERCUR. — Over current on power up.

5.Ø COMMAND DESCRIPTIONS

This section provides a detailed description of each XP/8X command which has a special function when the PLM-1 is mounted. Each command description lists the following information:

FUNCTION:	Briefly describes the effect of the command. Most XP/8X commands can be entered in two ways: from the XP/8X keypad, or from a computer terminal connnected to the XP/8X. The user must invoke the command using either of these methods.
KEYPAD KEY:	The key on the XP/8X keypad which the user must press to invoke the command when the XP/8X is in standalone mode.
TERMINAL ENTRY:	The letter which the user must enter from the terminal keyboard to invoke the command when the XP/8X is in terminal mode.
DISPLAY:	The text of the message which the XP/8X displays, if any, and the condition which that message indicates. In terminal mode, this message appears on the terminal; in standalone mode, on the keypad LED display.
USER INPUT:	Any additional information which the user must enter from the keypad or terminal after invoking the command. Some commands do not require any additional input.

The XP/8X displays a prompt character on the keypad LED display to signal the user that it is ready to receive input. For most commands, the prompt character is an asterisk ("*"). For commands which require the user to first press the "SELECT" key, such as the "DOWNLOAD" command, the prompt character is a caret ("^").

5.1 DEVICE SELECT

FUNCTION: Specify the type of PAL to be examined or programmed.

KEYPAD KEY: DEVICE

TERMINAL ENTRY: S

DISPLAY: DEVICE TYPE

USER INPUT: Refer to the "DEVICE DICTIONARY" section of this document to determine the proper device code for the type of PAL to be examined or programmed.

In terminal mode, the XP/8X displays a a list of the available device types along with their device codes; ">>SELECTED" appears next to the currently-selected device. This is followed by the following menu:

```
LIST - L
SELECT - (NN)
STEP - SPACE
QUIT - RETURN
```

To display the list again, enter "L". To select a device, enter its device code or enter a space to step through the list; the ">>SELECTED" indicator moves to the newly-selected device. Enter a carriage return to return to the "*" prompt.

In standalone mode, repeatedly press the "NEXT" next key until the desired device code appears on the LED display. Press the "SELECT" key to select the device code, then press the "EXIT" key.

5.2 LOAD

FUNCTION:	Reads contents of PAL, including phantom fuses, into RAM.
KEYPAD KEY:	LOAD
TERMINAL ENTRY:	L
DISPLAY:	LOADING PAL is being read into RAM.
USER INPUT:	none

5.3 EXAMINE RAM

FUNCTION: Examine contents of RAM, one bit at a time, to determine fuse state at each location.

KEYPAD KEY: EXAM

TERMINAL ENTRY: X

DISPLAY: <####> <state>

Where <####> represents a 2-digit product line followed by a 2-digit input line, and <state> represents the fuse state as follows:

"Ø" = intact
"1" = blown.

USER INPUT: To begin examining contents of RAM, enter a 4-digit decimal number; 2 digits for the product line followed by 2 for the input line. This yields the display described above. In standalone mode, press the "NEXT" key to examine the next input line. In terminal mode, enter a space to examine the next input line, or a "D" to examine the next product line.

5.4 BLANK CHECK

FUNCTION: Determine whether all fuses are intact.

KEYPAD KEY: BLNKCK

TERMINAL ENTRY: B

DISPLAY:

TESTING
Fuses are being checked.

BLANK
All fuses are intact.

FAIL <####>
Where <####> represents a 2-digit product line followed by a 2-digit input line. Fuse at indicated line is blown.

USER INPUT: none

5.5 VERIFY

FUNCTION: Determine whether all valid fuses are of the same polarity as the XP/8X's internal RAM.

KEYPAD KEY: VERIFY

TERMINAL ENTRY: V

DISPLAY:

VERIFY
Fuse polarity is being checked.

FAIL <####>
Where <####> represents a 2-digit product line followed by a 2-digit input line. Polarity of fuse at indicated line does not match XP/8X's internal RAM.

* (prompt)
Polarity of all valid fuses matches XP/8X's internal RAM.

USER INPUT: none

5.6 PROGRAM

FUNCTION: Remove all fuses which correspond to a "1" bit in RAM, one at a time; then execute the VERIFY command (see above).

KEYPAD KEY: PROG

TERMINAL ENTRY: P

DISPLAY: LOCKED

Program is locked; to unlock, press the following keys in order: "SELECT", "PROG", "SELECT", "LOCK"

FAIL <####>

Where <####> represents a 2-digit product line followed by a 2-digit input line. Polarity of fuse at indicated line failed to blow.

USER INPUT: none

5.7 SECURE PAL

FUNCTION: Remove both security fuses.

KEYPAD KEY: CMPL

TERMINAL ENTRY: N

DISPLAY: SECURE
Security fuses are being blown.

USER INPUT: Enter "ØD" to initiate command execution.

6.Ø HOW TO DOWNLOAD A FILE FROM A COMPUTER

The user may invoke a command to download, i.e., transfer, a file stored on the computer's disk into the XP/8X's internal RAM. This facility is essential to the use of development tools such as Monolithic Memories' PALASM assembler (which is available from LOGICAL DEVICES, INC.).

In order to download a file from a computer to the XP/8X's internal RAM, the computer must have a communications program on it which can initiate and execute the accurate transmission of the file to the XP/8X. An example of this is the SDPC version 2.Ø9 which is a software driver for Logical Devices' programmers including PLM-1 and 8X.

The contents of the XP/8X's internal RAM may be uploaded to a computer; see the section in the XP/8X manual entitled "UPLOAD TO HOST" for more information. Note, however, that the XP/8X's RAM can only be uploaded in INTEL or MOTOROLA hex format; JEDEC-format files cannot be uploaded to a computer. But you can observe your ASC II JEDEC file by dumping your 8X ram to the PC's screen starting at location 8ØØØH. You can also examine and edit your fuses using "EXAM" command starting from location ØØØØH.

6.1 PREPARING THE XP/8X TO DOWNLOAD A FILE

Before invoking the "DOWNLOAD" command, the user must first take the following preparatory steps:

1. Make sure that the PLM-1 is properly set up for the type of PAL to be programmed. To do this, follow the set-up procedure described in Section 2.Ø of this manual. This includes setting the jumper pin for a 2Ø-pin or 24-pin PAL, grounding and mounting the PLM-1 on the XP/8X.

2. Select the proper device code for the PAL via the "DEVICE SELECT" command as described in Section 5.1 of this manual.

3. Select the proper hex format setting for the file to be downloaded. When the PLM-1 is mounted, the legal hex format settings are JEDEC format or INTEL format. Refer to the section of the XP/8X manual entitled "SETTING HEX FORMAT" for information on how to select hex format. Select the "INTEL" setting for INTEL format, or the "MOTOROLA" setting for JEDEC format. Note that PALASM object files may be formatted in either INTEL or JEDEC hex format.

4. If the file to be downloaded is in JEDEC format, clear the XP/8X's internal RAM by entering the "FILL" command (keypad key "FILL", terminal entry "F") followed by "ØØ". JEDEC-formatted files do not affect unused bits in RAM; this step erases any leftover data from a previous operation.

6.2 DOWNLOADING THE FILE

Once the PLM-1 is set up in this manner, the user may proceed to download the file by taking the following steps:

1. Follow the instructions for the communications program up to the point where the file is just ready to be transmitted. This is running you SDPC till you are prompted with an "*".

2. Invoke the "DOWNLOAD" command. In stand-alone mode, press the "DOWNLOAD" keypad key; in terminal mode (SDPC), enter "T".

At this point, the XP/8X proceeds with post-download processing. When you are using SDPC; please wait till you are prompted with the proper JEDEC file checksum on your 8X's keypad. Refer to Section 6.2 for a description of post-download processing of files in INTEL format, or Section 6.3 for a description of post-download processing of files in JEDEC format.

Note: The post-download processing of JEDEC file is entirely done by 8X programmer; the user has to wait for successful operation.

6.3 POST-DOWNLOAD PROCESSING OF INTEL-FORMAT FILES

After downloading an INTEL-format file, the XP/8X displays either of the following:

1. The "*" prompt, indicating successful transmission of the file. The XP/8X stores a successfully downloaded file in RAM at location 0000 (hex). In terminal mode, the user may examine the file by entering "D00".

2. A checksum error message, indicating that a transmission error has occurred. The user should download the file again by repeating the procedure described in Section 6.1 ("DOWNLOADING THE FILE").

6.4 POST-DOWNLOAD PROCESSING OF JEDEC-FORMAT FILES

After downloading a JEDEC-format file, the XP/8X waits approximately 10 seconds, then takes steps outlined below. This process is also illustrated in Figure 6.

1. Creates an intact fuse map for the selected device, including phantom fuses.

2. Searches the file for the default fuse state. As described in the PALASM documentation, the default fuse state may optionally be specified in a line with the following format: a carriage return, line feed, or asterisk; followed by the character "F"; followed by the default fuse state value ("0" for intact, "1" for blown). If this line is not found in the file, the default fuse state value is "0".

3. Searches the file for fuse link information. As described in the PALASM documentation, each line containing fuse state settings uses the following format: a carriage return or line feed; followed by the character "L"; followed by a decimal number indicating the location in RAM to begin specifying fuse states; followed by any number of fuse state settings ("0" for intact, "1" for blown); followed by an asterisk. The XP/8X ignores fuse state settings other than 1 or 0.

4. Searches the file for a checksum. As described in the PALASM documentation, the checksum may optionally be specified in a line with the following format: the character "C"; followed by a 4-digit hexadecimal number specifying the checksum.

   If the downloaded file includes a checksum, the XP/8X displays either the "*" prompt, indicating successful transmission of the file; or a checksum error message, indicating that a transmission error has occurred. If the dowloaded file does not include a checksum, the XP/8X accumulates a checksum for the file and displays it. The user must press the "EXIT" key to return to the "*" prompt.

   The XP/8X stores a successfully downloaded file in RAM at location 0000 (hex). In terminal mode, the user may examine the file by entering "D00". If a transmission error has occurred, the user should download the file again by repeating the procedure described in Section 6.1 ("DOWNLOADING THE FILE").

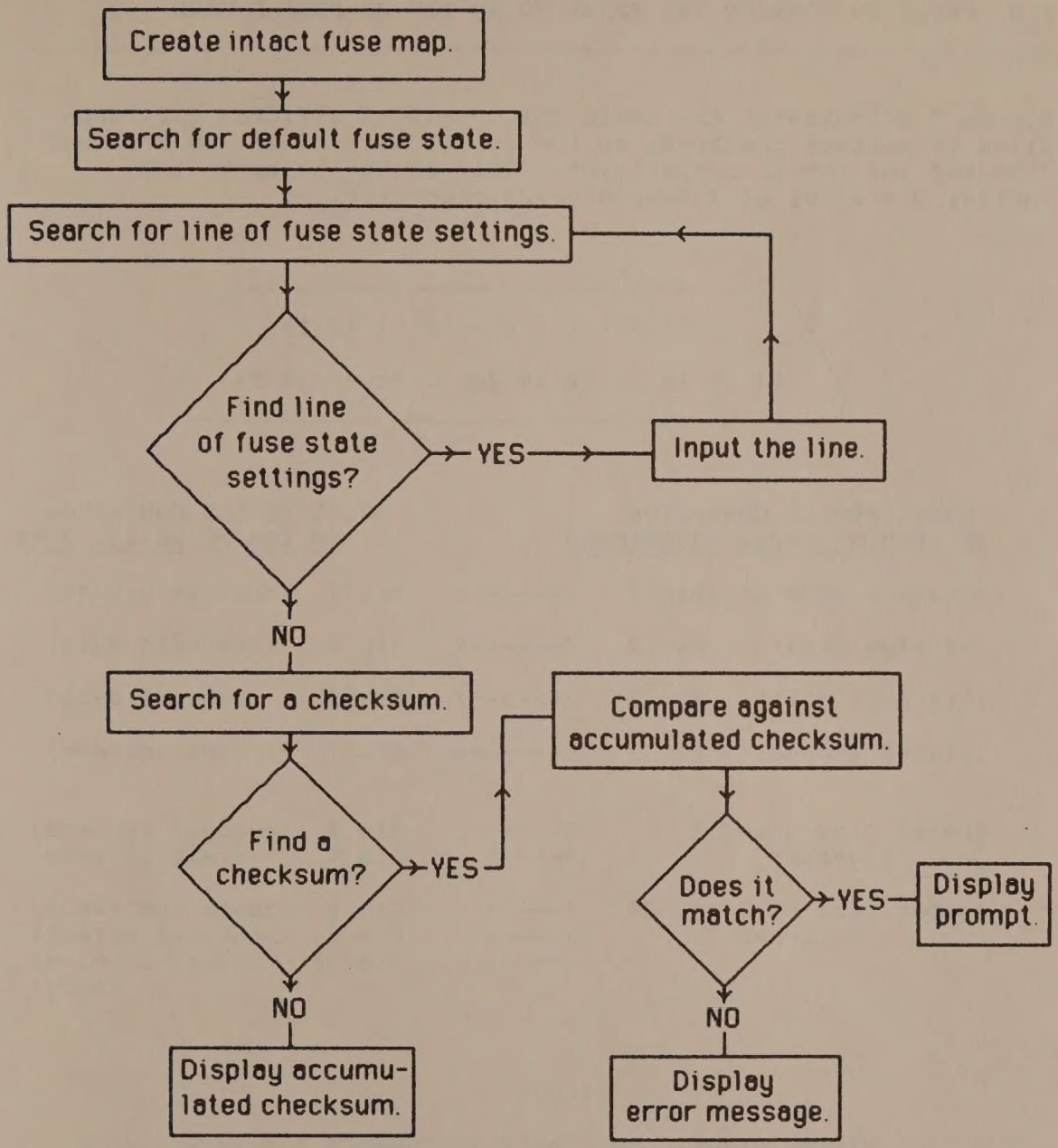
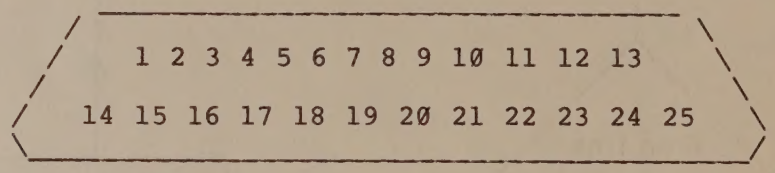


FIGURE 6

POST-DOWNLOAD PROCESSING OF A JEDEC-FORMAT FILE

7.Ø CABLE TO CONNECT THE XP/8X TO AN IBM PC SERIAL CARD

Figure 7 illustrates the cable which LOGICAL DEVICES, INC. supplies to connect the XP/8X to the serial card of an IBM Personal Computer (or IBM PC-compatible). This shows the back view (solder pin side) of a female DB-25 connector.



DB-25 FEMALE CONNECTOR TO PROMPRO-XP/8X PROGRAMMER			DB-25 FEMALE CONNECTOR TO IBM PC RS-232 PORT	
(chassis ground)	Pin 1	<------>	Pin 1	(chassis ground)
(receive data)	Pin 2	<------<	Pin 2	(transmit data)
(transmit data)	Pin 3	>------>	Pin 3	(receive data)
(signal ground)	Pin 7	<------>	Pin 7	(signal ground)
jumper pins 4 and 5 together		[----<	Pin 4	(request to send)
		[---->	Pin 5	(clear to send)
jumper pins 6, 8 and 20 together		[---->	Pin 6	(data set ready)
		[---->	Pin 8	(carrier detect)
		[----<	Pin 20	(data terminal ready)

FIGURE 7

WIRING DIAGRAM FOR CABLE TO CONNECT THE XP/8X TO AN IBM PERSONAL COMPUTER